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The Service Quality Evaluation of Mobile Communication from Quality Improvement Perspective ----a case study on China telecom in Wuchang District Wuhan City

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Abstract: Based on SERVAUAL model, this paper brings in the entropy method to rank quality improvement (QI) priority for service attributes, and a service quality evaluation(SQE) model integrating competitive analyses has been structured to evaluate the mobile communication service quality (SQ) for Wuhan Branch of China Telecom(WBCT). The research shows that the QI priority of 22 service attributes has changed as adopts entropy method comparing with gap-based SERVQUAL. The service attributes that finally should be improved have changed from Q_{20}(Various business charges reasonable) and Q_{22}(Record customer complaints and improve) to Q_{21}(provide customers all kinds of value-added services) and Q_{11}(Staff serves with high efficiency).

Key words: Service quality evaluation; Quality improvement; Mobile communication; China Telecom

1. INTRODUCTION

SQ has been a key factor of competitiveness for service enterprises. An important issue for many service enterprises is how to determine the service attribute with input and output benefits most and to make the QI decision scientifically[1]. Existing SQE methods are mostly static and isolated, lacking of competitive analysis. In fact, both internal resources and external competitive environment should be considered for enterprise to determine improving competitive SQ[2]. This paper will discuss the SQE method integrated competitive analyses, based on mobile communication service of China Telecom Wuhan Branch, through questionnaire to survey customers' SQE of China Telecom(CT), China Mobile(CM) and China Unicom(CU), to find out the service attributes of WBCT which need to be improved, and provides scientific basis for its quality improvement.

2. SQE MODEL INTEGRATING COMPETITIVE ANALYSES

2.1 Choose Evaluation Method

To SQE, there are divergences in which method should be used. Even though other evaluation methods existed, it is actually a controversies between SERVQUAL and SERVPERF[3][4]. Parasuraman has pointed out that the evaluation of Perceived SQ should be based on the purpose of research. SERVPERF will be the better choice to grasp the variation tendency of SQ, while SERVQUAL will be more suitable if the main purpose is to measure the perceived gap and diagnose the SQ [5]. And considering that in the same rating scale, gap-based method cannot reflects the satisfaction about different service attributes of customers, there are some limitations [6], while ratio-based method can let us make horizontal comparisons among different rating scales, it can preferably reflect the improvement priority of each service attributes, and results much more sensitive and reliable perceived SQ on customer satisfaction. So this paper adopts ratio-based SERVQUAL method, and SQ can be expressed as SQ=P/E. In order to ensure the continuity of the evaluation, the minimum score in the rating scale should be greater than zero. If the scores is greater than 1, it represent performance is exceeds expectation (P>E), while didn't meet customer expectation when less than 1 (P<E), and the SQ is just to achieve expectation if it equals 1.

2.2 SQ Attribute Priorities Integrating Competitive Analyses

In competitive environment, the competitors' SQ level should be considered when an enterprise improves its SQ, so that a different service could be delivered for customers to perceive it's unique. When a synchronous service is delivered by the enterprise and its competitors in market, i.e. the evaluations of customers about this service attributes of each enterprise are equal, according to entropy theory[7], the degree of confusion on this service attribute is highest, and this moment the entropy value of it is the highest too. Therefore the entropy method could be used to prioritize the service attributes.

Assume that there are several enterprises delivering similar services in the market. N customers are requested to use Likert-type scale with L-point to assess the performance of each enterprise from n service aspects. Calculating the mean of customer perceived service performance, a matrix X of service attribute performance can be achieved as follows: $X=\begin{pmatrix} x_{11} & \mathrm{K} & x_{1k} \\ \mathrm{M} & & \mathrm{M} \\ x_{n1} & \mathrm{L} & x_{nk} \end{pmatrix}$, in which x_{ij} is the jth performance in terms of ith service attribute ($x_{ij} \in [1, L]$; $i = 1,2,\mathrm{L}\ ,n$; $j = 1,2,\mathrm{L}\ ,k$).

Calculating the proportion of the jth enterprise in the ith service attribute P_{ij}: $P_{ij} = x_{ij} / \sum_{j=1}^{k} x_{ij}$. Then the ith service attribute entropy value d_i can be calculated according to the formulate: $d_i = \sum_{j=1}^{k} P_{ij} \ln\left(1 / P_{ij}\right)$. Normalizing the formula, then get the relative importance entropy value for service attribute i : $D_i = \frac{1}{\ln(k)} \sum_{j=1}^{k} P_{ij} \ln(1 / \ln P_{ij})$ 。 Here k is the number of enterprises, the value of Di ranges from 0 to 1. The more inconsistent evaluation results are, the smaller value of D_i is, minimum to 0. The more consistent evaluation results are, the larger value of D_i is, maximum to 1. If a company has no reason to think that one service attribute is more important than the others, the D_i values can be considered as a suitable weight set.

2.3 The Final Priorities Of Service Quality Attribute

The final importance ratings of the 22 service attributes should be determined by considering two kinds of level, the current SQ level and the competitive priority rating D_i. Be opposite to the ranking of entropy weight in competitive analyses, during the enterprise's self SQ level evaluating, notice that the higher the value of the ratio scale, the lower is the priority rating, So a multiplication approach [8] is suitable for integrating the two factors into the final importance ratings F_i, that is : $F_i = D_i \times \frac{1}{SQ_i}$.

Thus the integrating competitive analyses SQE process model of can be shown as figure 1.

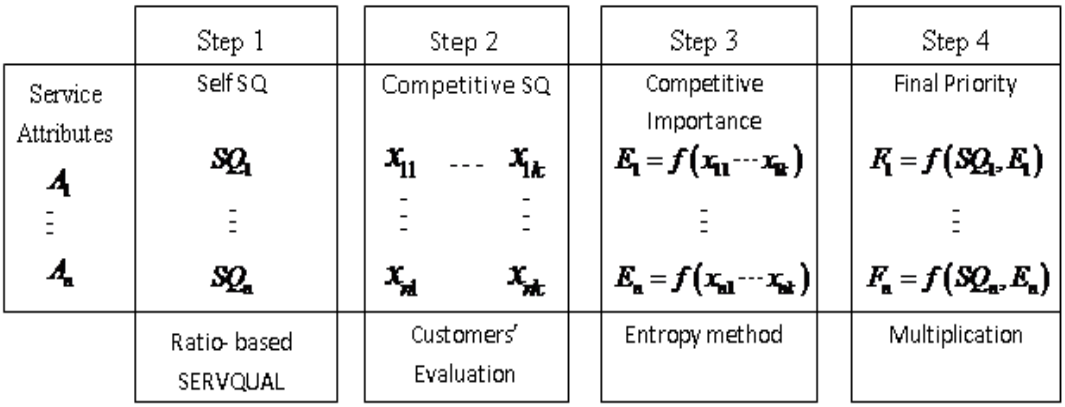

Figure 1: The Integrating Competitive Analyses SQ Evaluation Process Model

3. SQE OF MOBILE COMMUNICATION FOR CTWB

3.1 Questionnaire and Sampling Plan

The questionnaire adopts SERVQUAL, including three parts: the basic information of respondents，the SQ expectation and the SQ perception.Pre-survey was conducted in the ways of interviews and questionnaires. The result of pre-survey shows that the Cronbach's α coefficient of questionnaire is 0.934, and the coefficients of the expectation and perception of SQ are 0.887 and 0.940, showing a good reliability of questionnaire.

The formal investigation was mainly conducted in each big telecom business hall, residential quarters, and bookstores with a large flow of people and college campuses in Wuchang District, Wuhan City. 300 questionnaires have been distributed, among which 268 are valid. The effective rate is 89.33%. The Cronbach's α coefficient of this investigation is 0.9271, the Cronbach's α coefficients of the expectation and perception of SQ are 0.8636 and 0.9520, the KMO value is 0.819, Bartlett's test Chi-sq= 739.098(Sig=0.000<0.05), so the reliability and validity are both good.

3.2 Evaluation Result

Analyzing the 268 valid questionnaires, the evaluation result of 22 service attributes about WBCT is shown as table 1. The score that using gap-based SERVQUAL is -1.01, this datum is not a complete representation for users' dissatisfaction. Finding out that service attributes which are the most needed to be improved are Q_{20} and Q_{22}. While the SQ score that using ratio-based SERVQUAL is 0.784, that is relative to the users' expectation, 78.4% of their needs have been met, finding out that service attributes which are the most needed to be improved are Q_{20} and Q_{21}.

Table 1: Comparison of Results between Gap-based and Ratio-based SERVQUAL Scale of WBCT

Dimension	Service attributes	E-score	P-score	Gap-based SERVQUAL		Ratio-based SERVQUAL	
				Score	Rank	Score	Rank
Tangibles	Layout is reasonable and comfortable (Q_1)	4.11	3.99	-0.12	21	0.971	21
	Equipment is advanced and easy operate (Q_2)	4.52	3.55	-0.97	13	0.785	11
	Staff dresses appropriately(Q_3)	4.11	4.36	0.25	22	1.061	22
	Good service inquiry and complaints desk (Q_4)	4.73	3.72	-1.01	10	0.786	12
Reliability	Meet commitments in time(Q_5)	4.89	3.52	-1.37	6	0.720	7
	Concern and help customers (Q_6)	4.76	3.89	-0.87	16	0.817	18
	Call service is unobstructed (Q_7)	4.96	3.92	-1.04	9	0.790	13
	Provide timely and satisfied services (Q_8)	4.61	3.73	-0.88	15	0.809	16
	Correct business processing such as calling list (Q_9)	4.89	3.48	-1.41	5	0.712	5
Responsiveness	Response to customer requirements timely (Q_{10})	4.42	3.18	-1.24	7	0.719	6
	Staff serves with high efficiency (Q_{11})	4.71	3.11	-1.6	4	0.660	3
	Staff is willing to help customers (Q_{12})	4.55	3.55	-1	11	0.780	9
	Staff will not too busy to provide timely service (Q_{13})	4.45	3.45	-1	11	0.775	8
Assurance	Staff has rich professional knowledge(Q_{14})	4.51	3.86	-0.65	20	0.856	20
	Fell reliable when contacting staff (Q_{15})	4.68	3.82	-0.86	17	0.816	17
	Staff is in manners (Q_{16})	4.48	3.78	-0.7	19	0.844	19
	Staff has a strong sense of responsibility (Q_{17})	4.82	3.78	-1.04	8	0.784	10
Empathy	Give different customers personalized service (Q_{18})	4.52	3.58	-0.94	14	0.792	14
	Staff understands customer needs and give individual care (Q_{19})	4.22	3.36	-0.86	17	0.796	15
	Each business charges reasonable (Q_{20})	4.92	3.23	-1.69	1	0.657	1
	Provide customers all kinds of value-added services (Q_{21})	4.72	3.11	-1.61	3	0.659	2
	Record customer complaints and improve (Q_{22})	4.84	3.21	-1.63	2	0.663	4
	Overall SQ	4.61	3.599	-1.01		0.784	

Calculating the 22 service attributes entropy weight of three operators and ranking them as table 2. Integrating the entropy weight value of the SQ of WBCT and its competitors, the final ranking of all service attributes the enterprise should improve is as table 1. Comparing with the beginning ranking, the QI priority of 22 service attributes has changed. And Q_{21} and Q_{11} are the service attributes should be improved.

Table 2: The Entropy Weight of Service Attributes of Three Operators

Dimension	Service attributes	Customer evaluation			
		CT	CM	CU	Entropy weight
Tangibles	Layout is reasonable and comfortable (Q_1)	3.99	3.77	3.85	0.99975
	Equipment is advanced and easy operate (Q_2)	3.55	3.65	3.43	0.99971
	Staff dresses appropriately(Q_3)	4.36	4.12	4.22	0.99975
	Good service inquiry and complaints desk (Q_4)	3.72	3.46	3.56	0.99959
Reliability	Meet commitments in time(Q_5)	3.52	3.27	3.36	0.99958
	Concern and help customers (Q_6)	3.89	3.15	3.48	0.99662
	Call service is unobstructed (Q_7)	3.92	3.38	2.57	0.98679
	Provide timely and satisfied services (Q_8)	3.73	3.5	3.04	0.99676
	Correct business processing such as calling list (Q_9)	3.48	3.5	3.24	0.99945
Responsiveness	Response to customer requirements timely (Q_{10})	3.18	3.31	3.14	0.99977
	Staff serves with high efficiency (Q_{11})	3.11	3.38	3.02	0.99895
	Staff is willing to help customers (Q_{12})	3.55	3.42	3.16	0.99894
	Staff will not too busy to provide timely service (Q_{13})	3.45	3.15	3.29	0.99937
Assurance	Staff has rich professional knowledge(Q_{14})	3.86	3.38	3.43	0.99835
	Fell reliable when contacting staff (Q_{15})	3.82	3.27	3.29	0.99757
	Staff is in manners (Q_{16})	3.78	3.69	3.71	0.99995
	Staff has a strong sense of responsibility (Q_{17})	3.78	3.38	3.18	0.99764
Empathy	Give different customers personalized service (Q_{18})	3.58	3.04	2.86	0.99560
	Staff understands customer needs and give individual care (Q_{19})	3.36	3.19	2.86	0.99799
	Each business charges reasonable (Q_{20})	3.23	2.54	2.43	0.99255
	Provide customers all kinds of value-added services (Q_{21})	3.11	2.85	3.02	0.99941
	Record customer complaints and improve (Q_{22})	3.21	2.73	2.86	0.99785

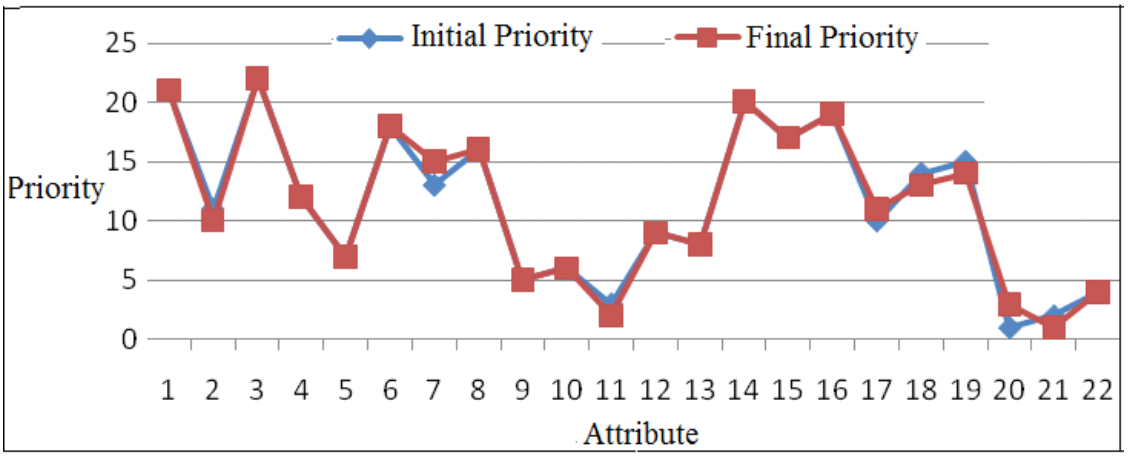

Figure 2: Final service attributes improvement ranking of WBCT

4. EVALUATION RESULT ANALYSIS AND MANAGEMENT SUGGESTIONS

4.1 Self SQE Result Analysis of WBCT

4.1.1 The Highest Priority Q_{20}

Q_{20} represents "Each business charges reasonable". In the telecommunications service industry, customer complaint involving charges have the highest percentage[9]. Therefore the result that service attributes should be improved mostly achieved with ratio-based SERVQUAL is reasonable. That is to realize "Each business charges reasonable" is the important factor to win competitiveness for China Telecom.

4.1.2 Priority Comparison Between Q_{22} and Q_{21}

Q_{22} represents "Record customer complaints and improve", which embodies the service recovery thinking of enterprise. While Q_{21} is "Provide customers all kinds of value-added services", it is the extra service provided by enterprise in order to satisfy customer needs, and for customers, it is the additional benefit[10]. Thus, customer complaint may lead customer give up the service of an enterprise, while value-added service may let customer choose the service of the other enterprise. This is the advantage of value-added services comparing to customer complaints improvement. So it is reasonable that the priority rating of Q_{22} is back of Q_{21} calculated in ratio-based SERVQUAL.

4.2 Competition Priority Rating Analysis of WBCT

4.2.1 The Priorities of Q_7, Q_{17} and Q_{20} Descend

The priorities of Q_7, Q_{17} and Q_{20} descend shows that compared to other service properties, the SQ of three telecom operators in the three service attributes quite different, and the three service attributes improvements need to invest in a lot of human and material and other resources.

4.2.2 The Priorities of Q_2, Q_{11}, Q_{18}, Q_{19} and Q_{21} Ascend

The priorities of Q_2, Q_{11}, Q_{18}, Q_{19} and Q_{21} ascend shows that compared to other service attributes; there are smaller differences between the SQ of three telecom operators in these service attributes. So for WBCT, the less resources invested will be able to improve these service attributes in maximum validity.

4.3 Management Suggestions

In this paper, the service attributes that finally confirmed to be improved for WBCT are Q_{21} and Q_{11}. And Q_{21} means "provide customers all kinds of value-added services" and Q_{11} is "Staff serves with high efficiency".

As to the improvement of service attribute Q_{21}, it is recommended that the company collect the user demands, and segment the value-added services market. Promote the value-added services through the channels such as business hall demo, the staff and social agents. Thus achieve the differentiation of value-added services brand and service. For the improvements of service attributes Q_{11}, it is recommended that the company improve staff's service awareness and service capacity through training and incentive mechanisms. At the same time, solve the problems such customer waiting in line for a long time, service hotline problem solved for the first time, and the convenience of online services by taking the measures such as improving the efficiency of the operating room services, enhance operator expertise and optimize service function of electronic channels.

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